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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/765,737	01/27/2004	Carl A. Reiser	C-3363	1103

7590 04/13/2009

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ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
04/13/2009	PAPER

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/765,737
Filing Date: January 27, 2004
Appellant(s): REISER, CARL A.

M.P. Williams
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed November 6, 2008, appealing from the Office action mailed June 24, 2008.

> The appeal brief is filed in the new format under the revised BPAI final rule before the effective date of the BPAI final rule. The Office published the BPAI final rule to amend the rules governing practice before the BPAI in *ex parte* patent appeals. *See Rules of Practice Before the Board of Patent Appeals and Interferences in Ex Parte Appeals; Final Rule, 73 FR 32938 (June 10, 2008), 1332 Off. Gaz. Pat. Office 47 (July 1, 2008).* However, the effective date for the BPAI final rule has been delayed. *See Rules of Practice Before the Board of Patent Appeals and Interferences in Ex Parte Appeals; Delay of Effective and Applicability Dates, 73 FR 74972 (December 10, 2008).* In the notice published on November 20, 2008, the Office indicated that the Office will not hold an appeal brief as non-compliant solely for following the new format even though it is filed before the effective date. *See Clarification of the Effective Date Provision in the Final Rule for Ex Parte Appeals, 73 FR 70282 (November 20, 2008).* Since the appeal brief is otherwise acceptable, the Office has accepted the appeal brief filed by appellant.

It is noted that the format for the current Appeal Brief filed under the transitional rules is correct. However, the numbering of the sections is incorrect, more specifically, number 6 has been left out.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

There are no related cases

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The statement of the status of claims contained in the brief is correct.

(8) Evidence Relied Upon

The following is a listing of the evidence relied upon in the rejection of claims under appeal.

US 6,815,101 B2	de Vaal et al.	November 9, 2004

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-2 and 4-5 are rejected under 35 U.S.C. 102(e) as being anticipated by de Vaal et al. (US 6,815,101 B2).

With regard to Claims 1 and 4, de Vaal et al. discloses a method comprising: providing a fuel reactant gas to fuel reactant gas flow fields of the fuel cell power plant

(column 7, lines 22-26). The reference discloses purging at least a small amount of partially depleted fuel reactant gas exiting from said flow fields (column 8, lines 22-39) and sensing the direction of flow of gas between said flow fields and ambient (column 9, lines 9-15). The sensing takes place when the hydrogen concentration sensor monitors the hydrogen concentration level in the ambient atmosphere surrounding the fuel cell stack, to determine that the direction of flow of fuel is from the flow fields to the ambient (column 9, lines 9-15). de Vaal et al. also discloses disconnecting the electrical load from the fuel cell stack in response to a low gas concentration in the ambient atmosphere (column 14, lines 48-51). The phrase "low gas flow" encompasses the claimed limitation "no gas flow".

The phrase "of reducing performance degradation due to hydrogen starvation of a fuel cell power plant providing electrical power to a load" is considered intended use. The limitation has been considered with regard to structure. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. See MPEP 2113. Therefore, the intended use limitation has been considered with regard to structure, but is not given patentable weight with regard to the use.

With regard to Claims 2 and 5, de Vaal et al. discloses an apparatus comprising: a fuel cell power plant having fuel reactant gas flow fields (column 7, lines 22-26) and a means for providing fuel reactant gas to said flow fields through a fuel system including a source of fuel such as one or more fuel tanks and a fuel regulating system for

controlling delivery of the fuel (column 7, lines 24-26). de Vaal et al. discloses a means for purging at least a small amount of partially depleted fuel reactant gas through a fuel purge valve (column 8, line 18) and a means for sensing the direction of flow of gas between said flow fields and ambient through a purge cell voltage sensor which detects a performance drop below a threshold level and sends a signal to a purge valve controller to open the purge valve and discharge the impurities into ambient, the ambient environment being monitored and controlled by other systems (column 8, lines 22-38). de Vaal et al. also discloses a means for disconnecting the electrical load from the fuel cell stack by opening a circuit relay with the power circuit relay controller (column 14, lines 48-67).

Similarly, the phrase "for reducing performance degradation due to hydrogen starvation of a fuel cell power plant providing electrical power to a load" is considered intended use. The limitation has been considered with regard to structure. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. See MPEP 2113. Therefore, the intended use limitation has been considered with regard to structure, but is not given patentable weight with regard to the use.

Claims 1 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over de Vaal et al. (US 6,815,101 B2).

With regard to Claims 1 and 4, de Vaal et al. discloses a method comprising: providing a fuel reactant gas to fuel reactant gas flow fields of the fuel cell power plant (column 7, lines 22-26). The reference discloses purging at least a small amount of partially depleted fuel reactant gas exiting from said flow fields (column 8, lines 22-39) and sensing the direction of flow of gas between said flow fields and ambient (column 9, lines 9-15). The sensing takes place when the hydrogen concentration sensor monitors the hydrogen concentration level in the ambient atmosphere surrounding the fuel cell stack, to determine that the direction of flow of fuel is from the flow fields to the ambient (column 9, lines 9-15). de Vaal et al. also discloses disconnecting the electrical load from the fuel cell stack in response to a low gas concentration in the ambient atmosphere (column 14, lines 48-51).

de Vaal et al. does not disclose disconnecting the electrical load from the fuel cell in the event that there is <u>no flow</u> of gas from the flow fields toward ambient. If the phrase low flow is not considered to encompass no flow, then it would have been obvious to one of ordinary skill in the art to disconnect the electrical load from the fuel cell when no gas flow is sensed so as not to damage the fuel cell due to lack of necessary gases and/or damage the load by continuing operation under conditions in which the fuel cell is not providing an uninterruptible power supply for the load. By teaching that a low flow will damage a fuel cell load, the prior art leads the skilled artisan to understand that no flow will at least cause the same type of damage.

Again, the phrase "of reducing performance degradation due to hydrogen starvation of a fuel cell power plant providing electrical power to a load" is intended use.

The intended use limitation has been considered with regard to structure. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. See MPEP 2113. Therefore, the intended use limitation has been considered with regard to structure, but is not given patentable weight with regard to the use.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over de Vaal et al. (US 6,815,101 B2), as applied to Claim 2 , and in further view of Gast (US Pub. No. 2005/0161520).

de Vaal et al. discloses the apparatus described above, but does not disclose wherein said means for sensing the direction of flow comprises a flap disposed within the flow of gas which will operate a switch when the flow of gas is toward ambient.

Gast discloses the use of simple flow sensors, such as those which are flow-actuated flaps or plates held in a preferred position, and send a signal as a function of their position (paragraph 0073). It would have been obvious to one of ordinary skill in the art to use a flap actuated sensor with the apparatus of de Vaal et al., because Gant teaches the flap actuated sensor enabling the circulation of circulating systems to be monitored and/or subject to close-loop and/or open-loop control as a function of power, flow and/or volumetric through-flow (paragraph 0074).

(10) Response to Argument

STATEMENT OF FACTS

Appellants statement of facts on pages 3 and 4 of the appeal brief state that “the Declaration of Carl Reiser, dated 2/18/08, establishes as unrefuted fact that the only monitoring of hydrogen in deVaal is hydrogen concentration (not flow) in an environment with oxygen, for the purpose of avoiding explosions.” Appellant also states that “Reiser establishes as unrefuted fact that deVaal does not monitor any flow at all.”

This statement is not unrefuted or a statement of fact. Not only does deVaal et al. disclose that there is a flow of gas between said flow fields and ambient (column 5, lines 3 -29; page 8 of the Response to arguments dated June 24, 2008), but it is also an inherent practice of a typical fuel cell to flow reactant fuel from the fuel source, through the fuel cell and the reaction products are exhausted from the cell. This is how a fuel cell generates electricity. For instance, deVaal et al. teaches that each fuel cell assembly 16 includes a membrane electrode assembly 20 including two electrodes, the anode 22 and the cathode 24, separated by an ion exchange membrane 26. The assembly is the reactive part of the fuel cell that generates electrons from the fuel. The fuel cell assembly 16 also includes a pair of separators or flow field plates 28 sandwiching membrane electrode assembly 20. Each of the flow field plates 28 includes one or more reactant channels 30 formed on a planar surface of flow field plate 28 adjacent an associated one of the electrodes 22, 24 for carrying fuel to anode 22 and oxidant to cathode 24, respectively. The fuel stack 12 is designed to operate in a dead-ended fuel mode, thus substantially all of the hydrogen fuel supplied to it during

operation is consumed, and little if any hydrogen is carried away from stack 12 in normal operation of system 10. Theoretically, this is the optimum use of fuel i.e. 100% efficiency. However, embodiments of the fuel cell can also be applicable to fuel cell systems operating on dilute fuels which are not dead-ended (column 5, lines 3-29) and the fuel cell, in practice, does not function at 100% efficiency. The fuel cell stack also includes a fuel stream inlet port and a fuel stream outlet port 35 for discharging an exhaust fuel stream from the fuel cell stack that comprises primarily water and non-reactive components and impurities, such as any introduced in the supply fuel stream or entering the fuel stream in stack 12. Hydrogen is the fuel used to generate electricity. Fuel stream outlet port 35 is normally closed with a valve in dead-ended operation. Although fuel cell stack 12 is designed to consume substantially all of the hydrogen fuel supplied to it during operation, traces of un-reacted hydrogen may also be discharged through the fuel stream outlet port 35 during a purge of fuel cell stack 12, affected by temporarily opening a valve at fuel stream outlet port 35 (column 5, lines 55-67). Therefore, while the phrase "flow of gas between flow fields and ambient" may not be specifically used, the process of fuel flowing through the flow fields in the fuel cell stack to ambient is clearly disclosed by deVaal et al.

Appellant also states, "the last element of all independent claims (1, 2, 4 and 5) recites "disconnecting the electrical load from the fuel cell stack in the event that there is [or 'in response to'] no flow of gas from said flow fields toward ambient". The bottom of page 5 of the Office Action (O.A.) dated 12/20/07, and the 2nd sentence of page 5, O.A.

dated 6/24/08 both state "deVaal does not disclose disconnecting the electrical load from the fuel cell in the event that there is no flow of gas from the flow fields toward ambient."

Appellants statement is substantially correct, however the rejection makes it clear that the prior art is being interpreted to note that low gas flow may include no gas flow since no gas flow is encompassed by the disclosure of a low gas flow. No gas flow is inherently the lowest amount of flow possible. deVaal discloses disconnecting the electrical load from the fuel cell stack in response to a low gas concentration in the ambient atmosphere (column 14, lines 48-51). In one interpretation, with regard to the 102(e) rejection, the electrical load is disconnected from the fuel cell stack in response to a low gas concentration, the phrase "low gas flow" clearly stated in the record to encompass the claimed limitation "no gas flow." In a second interpretation of the art, with regard to the 103(a) rejection, the interpretation of "low gas flow" does not encompass no gas flow. deVaal discloses the electrical load is disconnected from the fuel cell stack in response to a low gas concentration, making it obvious to disconnect the electrical load from the fuel cell when no gas flow is sensed so as not to damage the fuel cell due to lack of necessary gases and/or damage the load by continuing operation under conditions in which the fuel cell is not providing an uninterruptible power supply for the load (column 14, lines 48-51). Certainly, one skilled in the art would understand from these teachings that if low gas flow may damage the fuel cell load, then no gas flow would inflict the same damage.

ARGUMENTS

Claims 1, 2, 4 and 5, 35 USC 102(e), deVaal et al.

Appellant alleges an error on page 3, lines 8-12, of the rejection in stating that deVaal et al. discloses “the sensing takes place when the hydrogen concentration sensor monitors the hydrogen concentration level in the ambient atmosphere surrounding the fuel cell stack, to determine that the flow of fuel is from the flow fields to the ambient (column 9, lines 9-15)." Appellant responded to the rejection with a Declaration of Carl Reiser dated 2/18/08 in which Appellant states that the Declaration “presents only facts taken from the reference itself (deVaal), and totally unrefuted by the Examiner, establishes as fact that deVaal measures concentration (not flow) and that deVaal does not disclose monitoring any flow whatsoever."

The Declaration of Carl Reiser was considered not persuasive because it did not provide support for the statements that were made in the Declaration. Because the Declaration was not persuasive, it was refuted by Examiner, as stated on page 9 of the Response to Arguments dated June 24, 2008. With respect to the alleged error, deVaal et al. discloses in column 8 lines 18-37, the fuel cell stack 12 includes a fuel purge valve 70 provided at a fuel stream outlet port 35 of the fuel cell stack 12. Because of the cascaded flow design, any impurities (e.g., nitrogen) in the supply fuel stream tend to accumulate in purge cell portion 36 during operation. A build-up of impurities in purge cell portion 36 tends to reduce the performance of purge cell portion 36. The venting of hydrogen by the purge valve 70 during a purge is preferably limited (e.g., to less than 1 liter/minute on a continuous basis)("average hydrogen discharge rate") to prevent the

ambient environment monitoring and control systems from triggering a failure or fault. By measuring the hydrogen content, flow from the fuel cell is sensed. In response to Appellants argument that the deVaal reference fails to show certain features of the instant invention, it is noted that the features upon which Appellant relies (i.e., not monitoring hydrogen unadulterated by air) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See MPEP 2145.

Appellant argues an error in “Rejection page 3, lines 12-15: "deVaal also discloses disconnecting...in response to a low gas concentration...(column 14, lines 48-51). The phrase 'low gas flow’ encompasses the claimed limitation 'no gas flow’.” Appellant also states that "arbitrarily converting "concentration" to "flow" is error; this argument was not previously made."

This argument is not persuasive and has been previously made on page 8 of the Office Action dated June 24, 2008. Also, the conversion of "concentration" to "flow" has not been "arbitrarily" made, as indicated by Appellant. By measuring the concentration, as described in the reference, flow is clearly taught and established. The rejection stated, "not only does deVaal et al. disclose that there is a flow of gas between said flow fields and ambient, but it is also an inherent practice of a typical fuel cell. For instance, deVaal et al. teaches that each fuel cell assembly 16 includes a membrane electrode assembly 20 including two electrodes, the anode 22 and the cathode 24, separated by an ion exchange membrane 26. The fuel cell assembly 16 also includes a pair of

separators or flow field plates 28 sandwiching membrane electrode assembly 20. Each of the flow field plates 28 includes one or more reactant channels 30 formed on a planar surface of flow field plate 28 adjacent an associated one of the electrodes 22, 24 for carrying fuel to anode 22 and oxidant to cathode 24, respectively. Fuel stack 12 is designed to operate in a dead-ended fuel mode, thus substantially all of the hydrogen fuel supplied to it during operation is consumed, and little if any hydrogen is carried away from stack 12 in normal operation of system 10. However, embodiments of the fuel cell can also be applicable to fuel cell systems operating on dilute fuels which are not dead-ended (column 5, lines 3-29). The fuel cell stack also includes a fuel steam inlet port and a fuel stream outlet port 35 for discharging an exhaust fuel stream from the fuel cell stack that comprises primarily water and non-reactive components and impurities, such as any introduced in the supply fuel stream or entering the fuel stream in stack 12. Fuel stream outlet port 35 is normally closed with a valve in dead-ended operation. Although fuel cell stack 12 is designed to consume substantially all of the hydrogen fuel supplied to it during operation, traces of un-reacted hydrogen may also be discharged through the fuel stream outlet port 35 during a purge of fuel cell stack 12, affected by temporarily opening a valve at fuel stream outlet port 35 (column 5, lines 55-67). Therefore, while the phrase "low gas flow" may not be specifically used, the process of fuel flowing through the flow fields in the fuel cell stack to ambient is disclosed by deVaal et al.”

Appellant alleges an error in applying the rule about, “manner in which a claimed apparatus is intended to be employed, to claim 1 and 4, because they are method claims”. Appellant also states that this argument has not been previously made.

This argument is not persuasive and has been previously addressed in the Office Action dated June 24, 2008. The rejection states, “the phrase "of reducing performance degradation due to hydrogen starvation of a fuel cell power plant providing electrical power to a load" is considered intended use. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. See MPEP 2113. Therefore, the intended use limitation has been considered with regard to structure, but is not given patentable weight.”

It is further noted that the phrase "of reducing performance degradation due to hydrogen starvation of a fuel cell power plant providing electrical power to a load" is in the preamble of the instant claims. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). By disconnecting the load from the fuel cell at low flow, the reference inherently reduces flow degradation in an equivalent manner.

Appellant alleges an error that deVaal discloses “a means for sensing the direction of flow of gas between said flow fields and ambient” and states that the Declaration of Reiser “establishes as unrefuted fact that “deVaal does not disclose monitoring any flow whatsoever.”

This argument is not persuasive. The Declaration of Reiser does not provide any evidence of facts, as the interpretation was unsupported and the Declaration was not deemed persuasive. As noted in the Response to Argument dated June 24, 2008, on pages 10-12 , deVaal et al. discloses in column 8 lines 18-37, the fuel cell stack 12 includes a fuel purge valve 70 provided at a fuel stream outlet port 35 of the fuel cell stack 12. Because of the cascaded flow design, any impurities (e.g., nitrogen) in the supply fuel stream tend to accumulate in purge cell portion 36 during operation. A build-up of impurities in purge cell portion 36 tends to reduce the performance of purge cell portion 36. The venting of hydrogen by the purge valve 70 during a purge is preferably limited (e.g., to less than 1 liter/minute on a continuous basis) ("average hydrogen discharge rate") to prevent the ambient environment monitoring and control systems from triggering a failure or fault. By measuring the hydrogen content, flow from the fuel cell is sensed.

deVaal et al. also discloses an electronic fuel cell monitoring and control system 14 comprising various electrical and electronic components on a circuit board 38 and various sensors 44 and actuators 46 distributed throughout fuel cell system 10. Fuel cell system 10 provides fuel (e.g., hydrogen) to anode 22 by way of a fuel system 50. Fuel

system 50 includes a source of fuel such as one or more fuel tanks 52, and a fuel regulating system 54 for controlling delivery of the fuel. Fuel system 50 includes a hydrogen concentration sensor S5 and a hydrogen sensor check sensor S11. Additional controllers such as a hydride valve solenoid CS7 controls flow through the fuel tank valves 56. A hydrogen regulator 68 regulates the flow of hydrogen from fuel tanks 52. Fuel is delivered to the anodes 22 of the fuel cell assemblies 16 through a hydrogen inlet conduit 69 that is connected to fuel stream inlet port of stack 12. A fuel purge valve 70 is provided at fuel stream outlet port 35 of fuel cell stack 12 and is typically in a closed position when stack 12 is operating. A build-up of impurities in purge cell portion 36 tends to reduce the performance of purge cell portion 36; should the purge cell voltage sensor S4 detect a performance drop below a threshold voltage level, microcontroller 40 may send a signal to a purge valve controller CS4 such as a solenoid to open the purge valve 36 and discharge the impurities and other matter that may have accumulated in purge cell portion 36 (collectively referred to as "purge discharge"). The venting of hydrogen by the purge valve 70 during a purge is preferably limited (e.g., to less than 1 liter/minute on a continuous basis) ("average hydrogen discharge rate") to prevent the ambient environment monitoring and control systems, discussed below, from triggering a failure or fault. The fuel cell monitoring and control system 14 includes sensors for monitoring fuel cell system 10 surroundings and actuators for controlling fuel cell system 10 accordingly. For example, a hydrogen concentration sensor S5 (shown in FIG. 3) for monitoring the hydrogen concentration level in the ambient atmosphere surrounding fuel cell stack 12. Additionally, microcontroller 40 receives the various

sensor measurements such as fuel pressure, hydrogen concentration, air mass flow, and voltage across the purge cell portion of the fuel cell stack from various sensors. Microcontroller 40 provides the control signals to the various actuators, such as air compressor controller CS1 and purge valve controller CS4. See column 7, lines 22-67, column 8, lines 1-38, and column 9, lines 9-35.

Claims 1 and 4, 35 USC 103(a), deVaal et al.

Appellant alleges an error that "deVaal discloses sensing the direction of flow of gas between said flow fields and ambient (column 9, lines 9-15)." "The sensing takes place when the hydrogen concentration sensor...to determine that the direction of flow of fuel is from the flow fields to the ambient (column 9, lines 9-15)." Appellant alleges that paragraph 11 of the Declaration of Reiser established “unrefuted fact that deVaal does not disclose monitoring any flow whatsoever".

The Declaration of Reiser does not provide any evidence of “unrefuted facts”, as the interpretation was unsupported and the Declaration was not persuasive. As noted in the rejection on pages 10-12, dated June 24, 2008, deVaal et al., in fact, does disclose sensing the direction of flow of gas between flow fields and ambient. deVaal discloses in column 8 lines 18-37, the fuel cell stack 12 includes a fuel purge valve 70 provided at a fuel stream outlet port 35 of the fuel cell stack 12. The venting of hydrogen by the purge valve 70 during a purge is preferably limited to prevent the ambient environment monitoring and control systems from triggering a failure or fault. By measuring the hydrogen content, flow from the fuel cell is sensed.

deVaal et al. also discloses an electronic fuel cell monitoring and control system 14 comprising various electrical and electronic components on a circuit board 38 and various sensors 44 and actuators 46 distributed throughout fuel cell system 10. Fuel cell system 10 provides fuel (e.g., hydrogen) to anode 22 by way of a fuel system 50. Fuel system 50 includes a source of fuel such as one or more fuel tanks 52, and a fuel regulating system 54 for controlling delivery of the fuel. Fuel system 50 includes a hydrogen concentration sensor S5 and a hydrogen sensor check sensor S11. Additional controllers such as a hydride valve solenoid CS7 controls flow through the fuel tank valves 56. A hydrogen regulator 68 regulates the flow of hydrogen from fuel tanks 52. Fuel is delivered to the anodes 22 of the fuel cell assemblies 16 through a hydrogen inlet conduit 69 that is connected to fuel stream inlet port of stack 12. A fuel purge valve 70 is provided at fuel stream outlet port 35 of fuel cell stack 12 and is typically in a closed position when stack 12 is operating. A build-up of impurities in purge cell portion 36 tends to reduce the performance of purge cell portion 36; should the purge cell voltage sensor S4 detect a performance drop below a threshold voltage level, microcontroller 40 may send a signal to a purge valve controller CS4 such as a solenoid to open the purge valve 36 and discharge the impurities and other matter that may have accumulated in purge cell portion 36 (collectively referred to as "purge discharge"). The venting of hydrogen by the purge valve 70 during a purge is preferably limited (e.g., to less than 1 liter/minute on a continuous basis) ("average hydrogen discharge rate") to prevent the ambient environment monitoring and control systems, discussed below, from triggering a failure or fault. The fuel cell monitoring and control system 14 includes

sensors for monitoring fuel cell system 10 surroundings and actuators for controlling fuel cell system 10 accordingly. For example, a hydrogen concentration sensor S5 (shown in FIG. 3) for monitoring the hydrogen concentration level in the ambient atmosphere surrounding fuel cell stack 12. Additionally, microcontroller 40 receives the various sensor measurements such as fuel pressure, hydrogen concentration, air mass flow, and voltage across the purge cell portion of the fuel cell stack from various sensors. Microcontroller 40 provides the control signals to the various actuators, such as air compressor controller CS1 and purge valve controller CS4. See column 7, lines 22-67, column 8, lines 1-38, and column 9, lines 9-35.

Appellant argues that there is nothing to suggest that “it would have been obvious to…disconnect the electrical load when no gas flow is sensed…”. However, the rejection on page 5 of the rejection dated June 24, 2008, states that, “it would have been obvious to one of ordinary skill in the art to disconnect the electrical load from the fuel cell when no gas flow is sensed so as not to damage the fuel cell due to lack of necessary gases and/or damage the load by continuing operation under conditions in which the fuel cell is not providing an uninterruptible power supply for the load.” Performing these types of operations is well known in the art.

Errors in Response to Arguments

Appellant asserts that the “erroneous points and/or conclusions (which will not be so identified), presented in the Office Action dated June 24, 2008, have not previously been responded to”. These erroneous points and/or conclusions which are not identified, therefore, cannot be given consideration.

Appellant alleges an error in page 7, line 4-8 or the Response to Arguments in which it is stated “"A first rejection... is made because the method describes a process wherein a step occurs in response to other conditions; i.e., gas flow. If the condition is not met, then the claim does not require the method step." Appellant continues with questions as to what the previous statement means, what authorizes such analysis and how this reasoning affected the Examiner's conclusion.

Page 7, lines 4-16, of the response to arguments dated June 24, 2008, gives an explanation about the interpretation of the claim language presented in Claims 1, 2, 4, and 5, with respect to the prior art. The recitation “in the event that there is no gas flow", represents a situation in which claims are given their broadest reasonable interpretation in light of the supporting disclosure. See MPEP 2106. It is noted that, for example, the product claims do not require the use of the product to be taught in order to anticipate the claim. Because of this, the limitation “in the event that there is no gas flow” has been rejected not only as a 102(e) rejection, but also as a proper 103(a) rejection. As stated in the response, “deVaal discloses "disconnecting the electrical load from the fuel cell stack in response to a low gas concentration in the ambient

atmosphere" (column 14, lines 48-51). The phrase "low gas flow" encompasses the claimed limitation "no gas flow" because no gas flow is the lowest amount. Therefore, a proper 102(e) rejection has been established. A second rejection of Claims 1 and 4, under 35 U.S.C. 103(a), also by deVaal et al., is made in the situation where low gas flow does not encompass no gas flow. For that reason, the 103(a) rejection is also proper for these claims. deVaal teaches that a low gas flow may damage the loaded connected to the fuel cell and thus teaches disconnecting the load when flow is too low (column 14, lines 48-51).

Appellant alleges an error that, "by measuring the hydrogen content, flow from the fuel cell is sensed."

deVaal et al. discloses in column 8 lines 18-37, "the fuel cell stack 12 includes a fuel purge valve 70 provided at a fuel stream outlet port 35 of the fuel cell stack 12. The venting of hydrogen by the purge valve 70 during a purge is preferably limited (e.g., to less than 1 liter/minute on a continuous basis) ("average hydrogen discharge rate") to prevent the ambient environment monitoring and control systems from triggering a failure or fault." Thus, the reference teaches hat when the purge valve 70 opens and the venting of hydrogen occurs, a flow of hydrogen will also occur and, therefore, be sensed by the monitoring and control systems present in the system.

Appellant argues that "measuring hydrogen concentration is not "sensing the direction of the flow of gas", as called for in the claims".

As stated above, deVaal et al. discloses in column 8 lines 18-37, “the fuel cell stack 12 includes a fuel purge valve 70 provided at a fuel stream outlet port 35 of the fuel cell stack 12. The venting of hydrogen by the purge valve 70 during a purge is preferably limited (e.g., to less than 1 liter/minute on a continuous basis) ("average hydrogen discharge rate") to prevent the ambient environment monitoring and control systems from triggering a failure or fault.” When this disclosure is given it broadest reasonable interpretation, what is taught is that when the purge valve 70 opens and the venting of hydrogen occurs, a flow of hydrogen to ambient will also occur, and therefore, be sensed by the monitoring and control systems present. In order for hydrogen to be sensed in the ambient, hydrogen must flow through the exhaust. Therefore, flow to the ambient is measured using hydrogen concentration found in the ambient exhaust.

Further, it is noted that fuel inherently flows through the fuel cell to react at the anode catalyst and generate electricity. The reference teaches positive flow at the fuel source and sensors for monitoring fuel (Figure 3).

Appellant alleges an error that “…one cannot show non obviousness by attacking references individually where the rejections are based on combinations of references”. Appellant states that deVaal does not disclose sensing flow nor disconnecting load if there is no flow.

It has been addressed several times above that deVaal does teach sensing flow and the disconnecting a load if there is low flow, as well as the obviousness of disconnecting a load if there when there is no flow. The argument on page 13, lines 18-

20 of the Office Action dated June 24, 2008, "…one cannot show non obviousness by attacking references individually where the rejections are based on combinations of references", is maintained as being proper.

Conclusion

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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Examiner
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